

# Serum from Cows Fed Flaxseed Advanced Embryo Development from Lower Quality Oocytes In Vitro

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Embryonic loss in lactating dairy cows can be partially attributed to the detrimental effects of negative energy balance on oocyte and embryo quality. In previous studies, feeding flaxseed (high in  $\alpha$ -linolenic acid; ALA) reduced pregnancy losses in dairy cows possibly through accelerated embryo development. Recently, we found that feeding flax decreased the proportion of non-viable embryos in superovulated cows (Reprod Fertil Dev.2013; 26:218). Our objective was to evaluate the effects of ALA-enriched serum versus control fetal calf serum (FCS) on in vitro development of embryos derived from lower quality oocytes. Blood samples were collected at estrus from 4 Holstein cows given a ration of hay and concentrate mix containing flaxseed (8% DM) for >21 d, serum harvested and pooled. Oocytes obtained from abattoir ovaries were graded, and only lower quality (grade 3) oocytes were matured and fertilized (Day 0) in vitro. After fertilization, presumptive embryos (n=359; 5 replicates) were cultured with related sera (5%; ALA or FCS) for 8 d, evaluated on Days 1, 7 and 8, and data analyzed by PROC GENMOD. Results (Table 1) indicate that ALA-enriched serum produced more advanced stage embryos on Day 7 but no difference existed on Day 8.

**Table 1: Embryo development on Days 7 and 8 among treatments**

Developmental stages	Day 7		Day 8	
	ALA	FCS	ALA	FCS
% cleavage*	34.19	49.39	-	-
% total embryo	6.73 <sup>x</sup>	3.01 <sup>y</sup>	11.91	10.24
% early embryo	15.38 <sup>a</sup>	100.00 <sup>b</sup>	4.34	5.88
% advanced embryo	84.62	0.00	95.66	94.12

\*Cleavage rate was checked on Day 1. <sup>xy</sup>: P= 0.12; <sup>ab</sup>: P= 0.04

**Interpretation:** Serum from cows fed flaxseed increased the proportion of advanced stage embryos on Day 7, even from lower quality oocytes, possibly through selective accelerated development. *Research supported by Agriculture Funding Consortium, Alberta Milk and Alberta Agriculture and Rural Development.*